Listing of Claims

1   Claims (1-23): Canceled

1   Claim 24 (Previously presented): A device for setting up a plurality of virtual circuits

2   between a first end system and a second end system, said plurality of virtual circuits being

3   set up on a network connecting said first end system to said second end system, said device

4   comprising:

5   an outbound interface coupled to said network;

6   a message construction block coupled to said outbound interface; and

7   a call control logic for causing said message construction block to construct a first

8   signaling message requesting said plurality of virtual circuits to be set up, and to send said

9   first signaling message on said network to said second end system.

1   Claim 25 (Currently Amended): The device of claim ~~24~~ 141, further comprising a

2   signaling application programming interface (API), said signaling API receiving a request

3   for a group of virtual circuits from an external application, and communicating said request

4   to said call control logic, wherein said call control logic causes said single ~~first~~ signaling

5   message to be sent in response to said request.

1   Claim 26 (Currently Amended): The device of claim 25, wherein said outbound

2   interface sends said single ~~first~~ signaling message in the form of a plurality of asynchronous

3   transfer mode (ATM) cells, said device further comprising:

4   a signaling ATM adaptation layer (SAAL) output block to encapsulate data generated

5   by said message construction block to generate said single ~~first~~ signaling message, said

6   SAAL output block being coupled to said outbound interface.

1   Claim 27 (Currently Amended): The device of claim 141 ~~24~~, wherein said single ~~first~~

2   signaling message comprises a plurality of information elements, wherein a first information

3   element is designed to request set up of a single virtual circuit comprised in said plurality of

4   virtual circuits, and a second information element is designed to request set up of a second

5   plurality of virtual circuits comprised in said plurality of virtual circuits, said device further

6   comprising:

7   an inbound interface designed for receiving on said <u>ATM</u> network an acceptance

8   message indicating that only said single virtual circuit is possible to be provisioned if any of

9   a plurality of switches in a connection path between said first end system and said second end

10   system is designed not to support said plurality of virtual circuits; and

11   a parser designed for examining said acceptance message and forwarding said

12   acceptance message to said call control logic.

1   Claim 28 (Previously Presented): The device of claim 27, wherein said second

2   information element comprises a non-mandatory information element according to a

3   specification, wherein non-mandatory information elements can be ignored by said plurality

4   of switches according to said specification.

1   Claim 29 (Currently Amended): The device of claim 28, wherein said specification

2   comprises one of user to network interface (UNI) <u>or</u> ~~and~~ network to network interface (NNI).

1   Claim 30 (Currently Amended): The device of claim <u>128</u> ~~24~~, further comprising an

2   inbound interface designed for receiving an acceptance message, said acceptance message

3   indicating that a plurality of switches in a connection path between said first <u>ATM switch</u> ~~end~~

4   ~~system~~ and said second <u>ATM switch</u> ~~end system~~ have set up said plurality of virtual circuits.

1   Claim 31 (Previously Presented): The device of claim 30, wherein said plurality of

2   switches accept said plurality of virtual circuits but immediately provision fewer than said

3   plurality of virtual circuits, wherein said call control logic designed for causing said message

4   construction block to send a second signaling message to activate at least one of a plurality

5   of not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits.

1   Claim 32 (Currently Amended): The device of claim 30, wherein said plurality of

2   virtual circuits is treated as a group of virtual circuits, wherein said first <u>ATM switch</u> ~~end~~

3   ~~system~~ and said second <u>ATM switch</u> ~~end system~~ support a plurality of groups including said

4   group, said device further comprising a memory designed for storing a bundle structure

5   associated with each of said plurality of groups, wherein said bundle structure stores

6   information identifying the specific plurality of virtual circuits forming the corresponding

7   group.

1   Claim 33 (Previously Presented): The device of claim 32, wherein said memory is

2   designed to further store a plurality of call reference structures and a plurality of per-VC

3   structures,

4   wherein each of said plurality of call reference structures maintains the state of a call,

5   wherein signaling messages related to each group are received on a corresponding call, and

6   wherein each per-VC structure stores information related to a plurality of call

7   parameters accepted for a corresponding one of said plurality of virtual circuits.

1   Claim 34 (Previously Presented): The device of claim 33, wherein said device

2   comprises a switch in said connection path, said memory is further designed for storing a

3   plurality of switch structures, wherein each of said plurality of switch structures stores a

4   mapping of an identifier of each of said virtual circuit in inbound direction to another

5   identifier of the virtual circuit in outbound direction.

1   Claim 35 (Currently Amended): The device of claim 33, wherein said first <u>ATM</u>

2   <u>switch</u> ~~end system~~ comprises an edge router, wherein said <u>single</u> ~~first~~ signaling message

3   contains a bundle identifier which is propagated without translation by each of said plurality

4   of switches.

1   Claim 36 (Currently Amended): The device of claim 30, wherein said acceptance

2   message and said <u>single</u> ~~first~~ signaling message are both formed according to a common

3   format, wherein said common format contains a field which indicates whether a message

4   comprises said acceptance message or said <u>single</u> ~~first~~ signaling message.

1   Claim 37 (Currently Amended): The device of claim 36, wherein said format allows

2   a range of virtual circuits to be specified, said format further allowing a plurality of traffic

3   parameters to be specified for all of said range of virtual circuits, wherein said plurality of

4   parameters in said <u>single</u> ~~first~~ signaling message specify the desired parameters and said

5   plurality of parameters in said acceptance message specify the accepted parameters.

1   Claims 38-78: (Canceled)

1   Claim 79 (New): A method of setting up a plurality of virtual circuits between a first

2   asynchronous transfer mode (ATM) switch and a second ATM switch, said plurality of

3   virtual circuits being set up on a ATM network connecting said first ATM switch to said

4   second ATM switch, said method comprising:

5   sending on said ATM network to said second ATM switch a single signaling message

6   requesting said plurality of virtual circuits to be set up.

1   Claim 80 (New): The method of claim 79, wherein said single signaling message

2   comprises a plurality of information elements, wherein a first information element is designed

3   to request set up of a single virtual circuit comprised in said plurality of virtual circuits, and

4   a second information element is designed to request set up of a second plurality of virtual

5   circuits comprised in said plurality of virtual circuits, said method further comprising:

6   receiving an acceptance message indicating that only said single virtual circuit is

7   possible to be provisioned if any of a plurality of switches in a connection path between said

8   first ATM switch and said second ATM switch is designed not to support said plurality of

9   virtual circuits.

1   Claim 81 (New): The method of claim 80, wherein said second information element

2   comprises a non-mandatory information element according to a specification, wherein non-

3   mandatory information elements can be ignored by said plurality of switches according to

4   said specification.

1   Claim 82 (New): The method of claim 81, wherein said specification comprises one

2   of user to network interface (UNI) or network to network interface (NNI).

1   Claim 83 (New): The method of claim 79, further comprising:

2   receiving an acceptance message, said acceptance message indicating that a plurality

3   of ATM switches in a connection path between said first ATM switch and said second ATM

4   switch have set up said plurality of virtual circuits.

1   Claim 84 (New): The method of claim 83, wherein said plurality of ATM switches

2   accept said plurality of virtual circuits but immediately provision fewer than said plurality

3   of virtual circuits, said method further comprising:

4   sending a second signaling message to activate at least one of a plurality of not-yet-

1   provisioned virtual circuits comprised in said plurality of virtual circuits.

1   Claim 85 (New): The method of claim 84, wherein said fewer than said plurality of

2   virtual circuits corresponds to one virtual circuit such that only one virtual circuit is

3   provisioned in response to said single signaling message.

1   Claim 86 (New): The method of claim 85, wherein said sending is performed from

2   one of said first ATM system or said plurality of ATM switches.

1   Claim 87 (New): The method of claim 84, wherein said plurality of virtual circuits is

2   treated as a group of virtual circuits, wherein said first ATM switch and said second ATM

3   switch support a plurality of groups including said group, said method further comprising

4   maintaining a bundle structure associated with each of said plurality of groups, wherein said

5   bundle structure stores information identifying the specific plurality of virtual circuits

6   forming the corresponding group.

1   Claim 88 (New): The method of claim 87, further comprising:

2   maintaining a plurality of call reference structures, wherein each of said plurality of

3   call reference structures maintains the state of a call, wherein signaling messages related to

4   each group are received on a corresponding call; and

5   maintaining a plurality of per-VC structures, wherein each per-VC structure stores

6   information related to a plurality of call parameters accepted for a corresponding one of said

Reply to Office Action of 06/12/2006
Amendment Dated: August 7, 2006

Appl. No.: 09/976,004
Attorney Docket No.: CSCO-010/4390

7   plurality of virtual circuits.

1   Claim 89 (New): The method of claim 88, wherein said sending, said receiving and

2   each of said maintaining are performed in a switch contained in said connection path, said

3   method further comprising:

4   maintaining a plurality of switch structures, wherein each of said plurality of switch

5   structures stores a mapping of an identifier of each of said virtual circuit in inbound direction

6   to another identifier of the virtual circuit in outbound direction;

7   mapping each identifier received in inbound direction to a corresponding identifier

8   in outbound direction using said plurality of switch structures.

1   Claim 90 (New): The method of claim 89, wherein said first ATM switch comprises

2   an edge router and wherein said method is performed in said first edge router, wherein said

3   single signaling message contains a bundle identifier which is propagated without translation

4   by each of said plurality of switches.

1   Claim 91 (New): The method of claim 90, wherein each of said plurality of virtual

2   circuits comprises a switched virtual circuit.

1   Claim 92 (New): The method of claim 84, wherein said acceptance message and said

2   single signaling message are both formed according to a common format, wherein said

3   common format contains a field which indicates whether a message comprises said

4   acceptance message or said single signaling message.

1   Claim 93 (New): The method of claim 92, wherein said format allows a range of

2   virtual circuits to be specified, said format further allowing a plurality of traffic parameters

3   to be specified for all of said range of virtual circuits, wherein said plurality of parameters

4   in said first signaling message specify the desired parameters and said plurality of parameters

5   in said acceptance message specify the accepted parameters.

1   Claim 94 (New): The method of claim 93, further comprising sending a release

2   message requesting release of another range of virtual circuits.

1   Claim 95 (New): A method of supporting the setting up of a plurality of virtual

2   circuits between a first ATM switch and a second ATM switch, said plurality of virtual

3   circuits being set up on a ATM network connecting said first ATM switch to said second

4   ATM switch, each of said plurality of virtual circuits terminating at said first ATM switch

5   and said second ATM switch, said method being performed in a device, said method

6   comprising:

7   receiving from said first ATM switch on said ATM network a single signaling request

8   requesting said plurality of virtual circuits to be set up.

1   Claim 96 (New): The method of claim 95, wherein said method further comprises

2   sending an acceptance message if said plurality of virtual circuits can be set up between said

3   device and said second ATM switch in response to said single signaling request alone.

1   Claim 97 (New): The method of claim 96, wherein said method further comprises

2   provisioning all of said plurality of virtual circuits before said sending.

1   Claim 98 (New): The method of claim 96, further comprising provisioning fewer than

2   said plurality of virtual circuits to said second ATM switch before performing said sending.

1   Claim 99 (New): The method of claim 98, further comprising:

2   receiving a second signaling message requesting activation of at least one of said

3   not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits;

4   completing provisioning of said at least one of said not-yet-provisioned virtual

5   circuits; and

6   sending a completion message indicating said at least one of said not-yet-provisioned

7   virtual circuits have been activated.

1   Claim 100 (New): The method of claim 99, wherein said single signaling request

2   contains a plurality of parameters related to a range of virtual circuits comprised in said

3   plurality of virtual circuits, said method further comprising:

4   storing said plurality of parameters associated with said range of virtual circuits; and

5   provisioning said range of virtual circuits using said plurality of parameters,

6   whereby said plurality of parameters are transmitted only once for provisioning said

7   range of virtual circuits.

1   Claim 101 (New): The method of claim 100, wherein said single signaling request and

2   said second signaling message are in received in the form of ATM cells.

1   Claim 102 (New): The method of claim 101, wherein said device comprises one of

2   said first ATM switch, said second ATM switch, or a switch in the path of said plurality of

3   virtual circuits connecting said first ATM switch to said second ATM switch.

1   Claim 103 (New): An apparatus for supporting the setting up of a plurality of virtual

2   circuits between a first ATM switch and a second ATM switch, said plurality of virtual

3   circuits being set up on a ATM network connecting said first ATM switch to said second

4   ATM switch, said plurality of virtual circuits terminating at said first ATM switch and said

5   second ATM switch, said apparatus comprising:

6   an in-bound interface for receiving from said first ATM switch on said ATM network

7   a single signaling request requesting said plurality of virtual circuits to be set up.

1   Claim 104 (New): The apparatus of claim 103, wherein said apparatus further

2   comprises a call control logic for receiving said single signaling message, said apparatus

3   sending an acceptance message if said plurality of virtual circuits can be set up between a

4   device containing said apparatus and said second ATM switch in response to said single

5   signaling request alone.

1   Claim 105 (New): The apparatus of claim 104, wherein said call control logic is for

2   provisioning all of said plurality of virtual circuits before sending said acceptance message.

1   Claim 106 (New): The apparatus of claim 104, wherein said call control logic is for

2   provisioning fewer than said plurality of virtual circuits to said second ATM switch before

3   sending said acceptance message.

1   Claim 107 (New): The apparatus of claim 106, wherein said inbound interface is

2   designed to receive a second signaling message requesting activation of at least one of

3   not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits, wherein

4   said call control logic is configured to complete provisioning of said at least one of said

5   not-yet-provisioned virtual circuits and then to send a completion message indicating said at

6   least one of said not-yet-provisioned virtual circuits have been activated.

7

8   Claim 108 (New): The apparatus of claim 107, wherein said single signaling message

9   contains a plurality of parameters related to a range of virtual circuits comprised in said

10   plurality of virtual circuits, said apparatus further comprising a memory storing said plurality

11   of parameters associated with said range of virtual circuits, wherein said call control logic is

12   for provisioning said range of virtual circuits using said plurality of parameters, whereby said

13   plurality of parameters are transmitted only once for provisioning said range of virtual

14   circuits.

1   Claim 109 (New): The apparatus of claim 108 comprising one of said first ATM

2   switch, said second ATM switch or a switch in the path of said plurality of virtual circuits

3   connecting said first ATM switch to said second ATM switch.

1   Claim 110 (New): A device for setting up a plurality of virtual circuits between a first

2   ATM switch and a second ATM switch, said plurality of virtual circuits being set up on a

3   ATM network connecting said first ATM switch to said second ATM switch, said plurality

4   of virtual circuits terminating at said first ATM switch and said second ATM switch, said

5   device being located in a communication path between said first ATM switch and said second

6   ATM switch, said device comprising:

7   means for sending on said ATM network to said second ATM switch a single

8   signaling message requesting said plurality of virtual circuits to be set up.

1   Claim 111 (New): The device of claim 110, wherein said single signaling message

2   comprises a plurality of information elements, wherein a first information element is designed

3   to request set up of a single virtual circuit comprised in said plurality of virtual circuits, and

4   a second information element is designed to request set up of a second plurality of virtual

5   circuits comprised in said plurality of virtual circuits, said device further comprising:

6   means for receiving an acceptance message indicating that only said single virtual

7   circuit is possible to be provisioned if any of a plurality of switches in a connection path

8   between said first ATM switch and said second ATM switch is designed not to support said

9   plurality of virtual circuits.

1   Claim 112 (New): The device of claim 111, wherein said second information element

2   comprises a non-mandatory information element according to a specification, wherein non-

3   mandatory information elements can be ignored by said plurality of switches according to

4   said specification.

1   Claim 113 (New): The device of claim 112, wherein said specification comprises one

2   of user to network interface (UNI) or network to network interface (NNI).

1   Claim 114 (New): The device of claim 106, further comprising:

2   means for receiving an acceptance message, said acceptance message indicating that

3   a plurality of switches in a connection path between said first ATM switch and said second

4   ATM switch have set up said plurality of virtual circuits.

1   Claim 115 (New): The device of claim 114, wherein said plurality of switches accept

2   said plurality of virtual circuits but immediately provision fewer than said plurality of virtual

3   circuits, said device further comprising:

4   means for sending a second signaling message to activate at least one of a plurality

5   of not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits.

1   Claim 116 (New): The device of claim 115, wherein said plurality of virtual circuits

2   is treated as a group of virtual circuits, wherein said first end system and said second end

3   system support a plurality of groups including said group, said device further comprising

4   means for storing a bundle structure associated with each of said plurality of groups, wherein

5   said bundle structure stores information identifying the specific plurality of virtual circuits

6   forming the corresponding group.

1   Claim 117 (New): The device of claim 116, further comprising:

2   means for storing a plurality of call reference structures, wherein each of said plurality

3   of call reference structures maintains the state of a call, wherein signaling messages related

4   to each group are received on a corresponding call; and

5   means for a plurality of per-VC structures, wherein each per-VC structure stores

6   information related to a plurality of call parameters accepted for a corresponding one of said

7   plurality of virtual circuits.

1   Claim 118 (New): A device for supporting the setting up of a plurality of virtual

2   circuits between a first ATM switch and a second ATM switch, said plurality of virtual

3   circuits being set up on a ATM network connecting said first ATM switch to said second

4   ATM switch, each of said plurality of virtual circuits terminating at said first ATM switch

5   and said second ATM switch, said device comprising:

6   means for receiving from said first ATM switch on said ATM network a single

7   signaling request requesting said plurality of virtual circuits to be set up.

1   Claim 119 (New): The device of claim 118, wherein said device further comprises

2   means for sending an acceptance message if said plurality of virtual circuits can be set up

3   between said device and said second ATM switch in response to said single signaling request

4   alone.

1   Claim 120 (New): The device of claim 119, wherein said device further comprises

2   means for provisioning all of said plurality of virtual circuits before sending said acceptance

3   message.

1   Claim 121 (New): The device of claim 119, further comprising means for

2   provisioning fewer than said plurality of virtual circuits to said second ATM switch before

3   performing said sending.

1   Claim 122 (New): A computer readable medium carrying one or more sequences of

2   instructions for causing a device to set up a plurality of virtual circuits between a first ATM

3   switch and a second ATM switch, said plurality of virtual circuits being set up on a ATM

4   network connecting said first ATM switch to said second ATM switch, each of said plurality

5   of virtual circuits terminating at said first ATM switch and said second ATM switch, said

6   device being located in a communication path located between said first ATM switch and

7   said second ATM switch, wherein execution of said one or more sequences of instructions

8   by one or more processors contained in said device causes said one or more processors to

9   perform the action of:

10   sending on said ATM network to said second ATM switch a single signaling message

11   requesting said plurality of virtual circuits to be set up.

1   Claim 123 (New): The computer readable medium of claim 122, wherein said single

2   signaling message comprises a plurality of information elements, wherein a first information

3   element is designed to request set up of a single virtual circuit comprised in said plurality of

4   virtual circuits, and a second information element is designed to request set up of a second

5   plurality of virtual circuits comprised in said plurality of virtual circuits, further comprising:

6   receiving an acceptance message indicating that only said single virtual circuit is

7   possible to be provisioned if any of a plurality of switches in a connection path between said

8   first ATM switch and said second ATM switch is designed not to support said plurality of

9   virtual circuits.

1   Claim 124 (New): The computer readable medium of claim 123, wherein said second

2   information element comprises a non-mandatory information element according to a

3   specification, wherein non-mandatory information elements can be ignored by said plurality

4   of switches according to said specification.

1   Claim 125 (New): The computer readable medium of claim 122, further comprising:

2   receiving an acceptance message, said acceptance message indicating that a plurality

3   of switches in a connection path between said first ATM switch and said second ATM switch

4   have set up said plurality of virtual circuits.

1   Claim 126 (New): The computer readable medium of claim 125, wherein said

2   plurality of switches accept said plurality of virtual circuits but immediately provision fewer

3   than said plurality of virtual circuits, further comprising:

4   sending a second signaling message to activate at least one of a plurality of not-yet-

5   provisioned virtual circuits comprised in said plurality of virtual circuits.

1   Claim 127 (New) The computer readable medium of claim 126, wherein said fewer

2   than said plurality of virtual circuits corresponds to one virtual circuit such that only one

3   virtual circuit is provisioned in response to said first signaling message.

4   Claim 128 (New): The computer readable medium of claim 127, wherein said

5   plurality of virtual circuits is treated as a group of virtual circuits, wherein said first end

6   system and said second end system support a plurality of groups including said group, further

7   comprising maintaining a bundle structure associated with each of said plurality of groups,

8   wherein said bundle structure stores information identifying the specific plurality of virtual

9   circuits forming the corresponding group.

1   Claim 129 (New): The computer readable medium of claim 128, further comprising:

2   maintaining a plurality of call reference structures, wherein each of said plurality of

3   call reference structures maintains the state of a call, wherein signaling messages related to

4   each group are received on a corresponding call; and

5   maintaining a plurality of per-VC structures, wherein each per-VC structure stores

6   information related to a plurality of call parameters accepted for a corresponding one of said

7   plurality of virtual circuits.

1   Claim 130 (New): The computer readable medium of claim 129, wherein said

2   sending, said receiving and each of said maintaining are performed in a switch contained in

3   said connection path, further comprising:

4   maintaining a plurality of switch structures, wherein each of said plurality of switch

5   structures stores a mapping of an identifier of each of said virtual circuit in inbound direction

6   to another identifier of the virtual circuit in outbound direction;

7   mapping each identifier received in inbound direction to a corresponding identifier

8   in outbound direction using said plurality of switch structures.

1   Claim 131 (New): The computer readable medium of claim 129, wherein said first end

2   system comprises an edge router and wherein said actions are performed in said first edge

3   router, wherein said first signaling message contains a bundle identifier which is propagated

4   without translation by each of said plurality of switches.

1   Claim 132 (New): The computer readable medium of claim 125, wherein said

2   acceptance message and said first signaling message are both formed according to a common

3   format, wherein said common format contains a field which indicates whether a message

4   comprises said acceptance message or said first signaling message.

1   Claim 133 (New): The computer readable medium of claim 132, wherein said format

2   allows a range of virtual circuits to be specified, said format further allowing a plurality of

3   traffic parameters to be specified for all of said range of virtual circuits, wherein said plurality

4   of parameters in said first signaling message specify the desired parameters and said plurality

5   of parameters in said acceptance message specify the accepted parameters.

1   Claim 134 (New): The computer readable medium of claim 133, further comprising

2   sending a release message requesting release of another range of virtual circuits.

1   Claim 135 (New): A computer readable medium carrying one or more sequences of

2   instructions for causing a device to support the setting up of a plurality of virtual circuits

3   between a first ATM switch and a second ATM switch, said plurality of virtual circuits being

4   set up on a ATM network connecting said first ATM switch to said second ATM switch, each

5   of said plurality of virtual circuits terminating at said first ATM switch and said second ATM

6   switch, wherein execution of said one or more sequences of instructions by one or more

7   processors contained in said device causes said one or more processors to perform the action

8   of:

9   receiving from said first ATM switch on said ATM network a single signaling request

10   requesting said plurality of virtual circuits to be set up.

1   Claim 136 (New): The computer readable medium of claim 135, further comprising

2   sending an acceptance message if said plurality of virtual circuits can be set up between said

3   device and said second ATM switch in response to said single signaling request alone.

1   Claim 137 (New): The computer readable medium of claim 136, further comprising

2   provisioning all of said plurality of virtual circuits before said sending.

1

2   Claim 138 (New): The computer readable medium of claim 136, further comprising

3   provisioning fewer than said plurality of virtual circuits to said second end system before

4   performing said sending.

1   Claim 139 (New): The computer readable medium of claim 138, further comprising:

2   receiving a second signaling message requesting activation of at least one of said not-

3   yet-provisioned virtual circuits comprised in said plurality of virtual circuits;

4   completing provisioning of said at least one of said not-yet-provisioned virtual

5   circuits; and

6   sending a completion message indicating said at least one of said not-yet-provisioned

7   virtual circuits have been activated.

1   Claim 140 (New): The computer readable medium of claim 139, wherein said first

2   signaling message contains a plurality of parameters related to a range of virtual circuits

3   comprised in said plurality of virtual circuits, further comprising:

4   storing said plurality of parameters associated with said range of virtual circuits; and

5   provisioning said range of virtual circuits using said plurality of parameters,

6   whereby said plurality of parameters are transmitted only once for provisioning said

7   range of virtual circuits.

8   Claim 141 (New): The device of claim 24, wherein said first end system is a first

9   ATM switch, said second end system is a second ATM switch, said first signaling message

10   is a single signaling message, and said network is an ATM network.